

**Time-of-Flight Mass Spectrometry Utilizing Finite Impulse Response Filters to Improve  
Resolution and Reduce Noise**

**ABSTRACT**

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A mass spectrometer having an ion accelerator and an ion detector utilizing a finite impulse response filter is disclosed. The ion accelerator generates an ion pulse in response to a start signal. A clock increments a register that indicates the time that has elapsed since the start signal. The ion detector is spatially separated from the ion accelerator and generates a measurement signal indicative of ions striking the detector. The measurement signal is filtered through a finite impulse response filter to form a filtered measurement signal. The finite impulse response filter has a filter function that depends on the impulse response of the ion detector. In one embodiment, the mass spectrometer includes a memory that is addressed by the register value and an adder. The adder forms the sum of the data value specified by the register value and the output value from the finite impulse response filter.